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Federal Communications Commission
1919 M Street
Washington, DC 20554

Subject: Comments on FCC NPRM 91-337, MM Docket No. 87-268

Dear Mr. Secretary and Commissioners,

Further to my facsimile of 20 December 1991, enclosed please find fifteen (15) copies of Comments on FCC NPRM 91-337, MM Docket No. 87-268: In the Matter of Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service.

I would appreciate three copies each being delivered to Chairman Sikes, and to Commissioners Barrett, Duggan, Marshall, and Quello.

Sincerely,

David L. Tennenhouse
Assistant Professor,
Electrical Engineering & Computer Science

19 December 1991

Before the
Federal Communications Commission
1919 M Street
Washington, DC 20554

In the Matter of   )
Advanced Television Systems   )
and Their Impact Upon the   )   MM Docket No. 87-268
Existing Television Broadcast   )
Service   )

COMMENTS OF
David L Tennenhouse
Telemedia, Networks & Systems Group
Laboratory for Computer Science
Massachusetts Institute of Technology

These comments are directed to FCC NPRM 91-337 Paragraph 47: Compatibility with Other Media. They are submitted in my capacity as a private citizen and as a research scientist. These comments support the view that compatibility with other media should be an essential characterisitic of any ATV system.

At MIT, I pursue teaching and research in the areas of telecommunication and computer systems, with particular emphasis on distributed video systems. My group's research projects in the areas of networking and high resolution systems are supported by a number of organizations, including DARPA, NSF, NYNEX, Bellcore, Apple, and DEC. In the past I have participated in standardization efforts concerned with Open System Interconnection (OSI) and Broadband ISDN (B-ISDN). I am a charter member of the Committee on Open High Resolution Systems, and I contribute to the SMPTE Header/Descriptor group.

It is encouraging to see the FCC taking a leadership role in the coordination of cross-industry issues arising at the confluence of the television, computing, and telecommunication industries. Harmonization of these industries will clearly be facilitated by the selection of a digital coding. Such a coding must provide for scalability, particularly with respect to resolution -- rather than entrench a single parameter set, it must provide the basis for a *staircase of standards*, that will support ongoing improvement in video resolution.

However, a further enabling step will be required. The digital information must be *structured* in a manner that facilitates inter-operability across industrial boundaries, allowing the same information to be interpreted in different ways within different domains. For example, the television industry may choose to view a program segment as a continuous video stream, while the telecommunications industry might treat that same coded information as a transparent sequence of bits to be transmitted. Within the computer industry, those same bits may be interpreted as a complex data structure.

The technical objectives for *structured video* are clear -- It must be universal, extensible, editable, and long lived. It should provide a hierarchical framework that supports cross referencing across standards boundaries, so that information coded in terms of many standards can co-exist within a single environment. For example, it should be possible to embed

text, graphics, captions, and audio information within ATV video streams. Similarly, it should be possible to embed these video streams within compound multi-media documents that are manipulated by workstation-based applications. These objectives are not far fetched -- they are achievable using existing hardware and software technology.[1] Furthermore, organizations such as SMPTE, are already investigating approaches to their standardization.
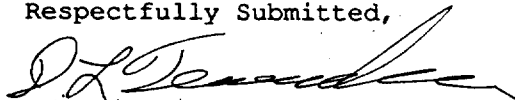
The architectural manner in which *structured video* is achieved will be critical to the future development of the nation's telecommunications infrastructure, both switched and broadcast, and its computer technology, both hardware and software. Although it might be attractive to develop a comprehensive monolithic architecture than spans all three industries, this would be a mistake. Such a structure would be obsolete in advance of its deployment and would only serve to reduce the scope of, and incentive for, further innovation.

The problem is rooted in the different evolutionary patterns of the three industries. Although each industry is undergoing rapid improvement in its technological substrate, there is a marked difference in the rates at which innovations can be *rolled out* to the public. Whereas the computer industry introduces incremental improvements on an almost monthly basis, the telecommunication and television industries, for obvious structural reasons, introduce much more significant quantum changes at less frequent intervals.

Accordingly, it is crucial that any standard for *structured video* be based on a flexible cross-industry structure that supports ongoing (and disjoint) innovation with the individual domains. It should be possible for different experts groups and standards bodies to autonomously develop and evolve specifications within their domains of expertise.

I believe that the FCC has a historic opportunity to spearhead the establishment of such an organizational structure. My optimisim is based on the recent shift towards cross-industrial collaboration. Recently, I hosted a "Video Standards Harmonization" workshop which brought together representatives from the three industries, a few standards organizations, government and academia. Though not yet common place, such interaction is also found in groups such as COHRS and the SMPTE Header/Descriptor activity. Not so long ago just getting those people into the same room would have been an achievement. I encourage the FCC to continue its activities in this area and act quickly to leverage the support for cross-industry harmonization that is now emerging.

Respectfully Submitted,

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[1] An early (though somewhat primitive) demonstration of cross referencing is provided by Apple's QuickTime environment. Video sequences can be incorporated into documents which are then manipulated using off-the-shelf applications, including the WORD package used to prepare this submission.